American Potato Journal

LIBRARY
SCHOOL OF AGRICULTURE
AND EXPERIMENT STATION
STATE COLLEGE, PA.

Published Monthly by

THE POTATO ASSOCIATION OF AMERICA

East Lansing, Michigan

VOLUME VIII APRIL, 1931 NUMBER 4

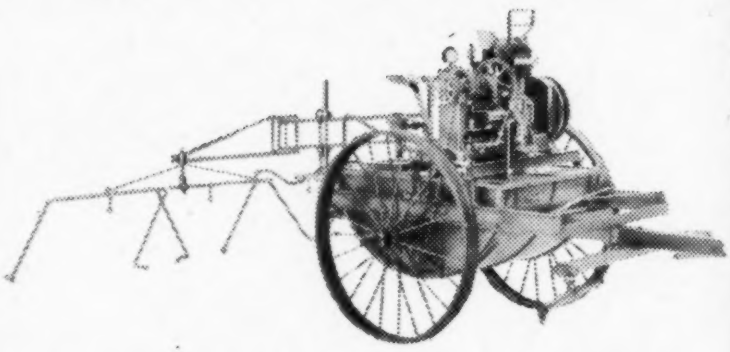
C-O-N-T-E-N-T-S

Entered as second class matter at East Lansing, Michigan, March 4, 1928, under Act of March 3, 1879.

Accepted for mailing at special rate of postage provided for in section 412, Act of February 28, 1925, authorized on March 14, 1928.

SUBSCRIPTION PRICE $1.00 PER YEAR

Buy
Bean Sprayers or Dusters
For Potato Work



They are proven to produce greater profits for the growers. They are proven to do better work and to do it faster and with the least annoyance. Stops on the field for nozzle clogging or other trouble are almost unheard of if the machines are given a little care between sprayings.

We manufacture anything you are apt to need regardless of the acreage to be sprayed or dusted. We can furnish you with power or traction sprayers and dusters in any size at any price so that you can select one exactly suited to your own requirements and that fits your pocketbook.

It is vital in your selection of a sprayer that you decide upon that one that is proven to be the most dependable under actual field conditions.

The quality and performance of Bean Sprayers and Dusters is unquestioned and the Bean leadership is established.

Complete sprayer and duster literature will be sent upon request; ask for catalog P. A. A.

JOHN BEAN MFG. CO.

Division Food Machinery Corporation

Lansing, Mich. **San Jose, Calif.**

AMERICAN POTATO JOURNAL

PUBLISHED BY

THE POTATO ASSOCIATION OF AMERICA

EAST LANSING, MICHIGAN

OFFICERS AND EXECUTIVE COMMITTEE

John S. Gardner, President ..... University of Kentucky, Lexington, Kentucky
J. R. Livermore, Vice-President ..... Cornell University, Ithaca, New York
H. C. Moore, Secretary-Treasurer ..... East Lansing, Michigan
F. M. Harrington ..... Bozeman, Montana
John Bushnell ..... Ohio Experiment Station, Wooster, Ohio

Impressions of Potato Growing and Potato Experiments in England*

JOHN BUSHNELL, Experiment Station, Wooster, Ohio.

During a trip through England last August I had an opportunity to visit two of the leading potato districts: Lincolnshire at the east, and Lancashire at the west. Lincolnshire is part of a large, fertile, eastern plain which extends through the northeastern district shown on the map. Much of this plain is a rich silt soil, producing excellent crops of wheat and potatoes. According to the Agricultural Statistics (1929) compiled by the Ministry of Agriculture, the ten-year average yield for this district is 250 bushels (6.7 British tons) per acre of potatoes and 35 bushels of wheat. In Norfolk, the outstanding county in yields, the potatoes averaged 370 bushels per acre in the bumper crop of 1929.

Lancashire is in a smaller plain in the center of the northwest district. The soil as I saw it was sandier, not as well adapted to small grains, but excellent for potatoes. Here the total acreage is less, but the average yield of potatoes nearly equals that of the richer soil of the eastern plain. Although the centers of these two districts are less than a hundred miles apart, it is a curious fact that the Lancashire district is infested with the wart disease ***(Synchytrium endobioticum)*** while the Lincolnshire district is free from it. Only immune varieties are grown in the west, while Lincolnshire enjoys the privilege of producing susceptible varieties which command a premium upon the large markets. It follows that energetic quarantine

*Address of the retiring president, read at the Annual Meeting, Cleveland, Dec. 30, 1930.

methods are in force to keep the wart out of the eastern counties. Not that the popular susceptible variety, King Edward, is actually superior in culinary qualities to some of the immune varieties, but it has a distinguishing pink tinge near the eye which identifies it on the market.

The smooth, white potatoes of high quality are not easily distinguished from the coarse, white varieties grown primarily for stock food on the continent. Moreover, in seasons of short crops these coarse, white potatoes find their way to the English markets. After a season of coarse, white potatoes the Englishman turns with renewed enthusiasm to his pink-eyed King Edward. Hence it is that in regions free from the wart the price of potatoes is higher than in the infected regions. I gathered that in Lincolnshire a fair price for King Edwards was about 5 pounds (sterling) per ton, that is, about 65 cents a bushel. In Lancashire the price averaged 10 to 20 cents per bushel less.

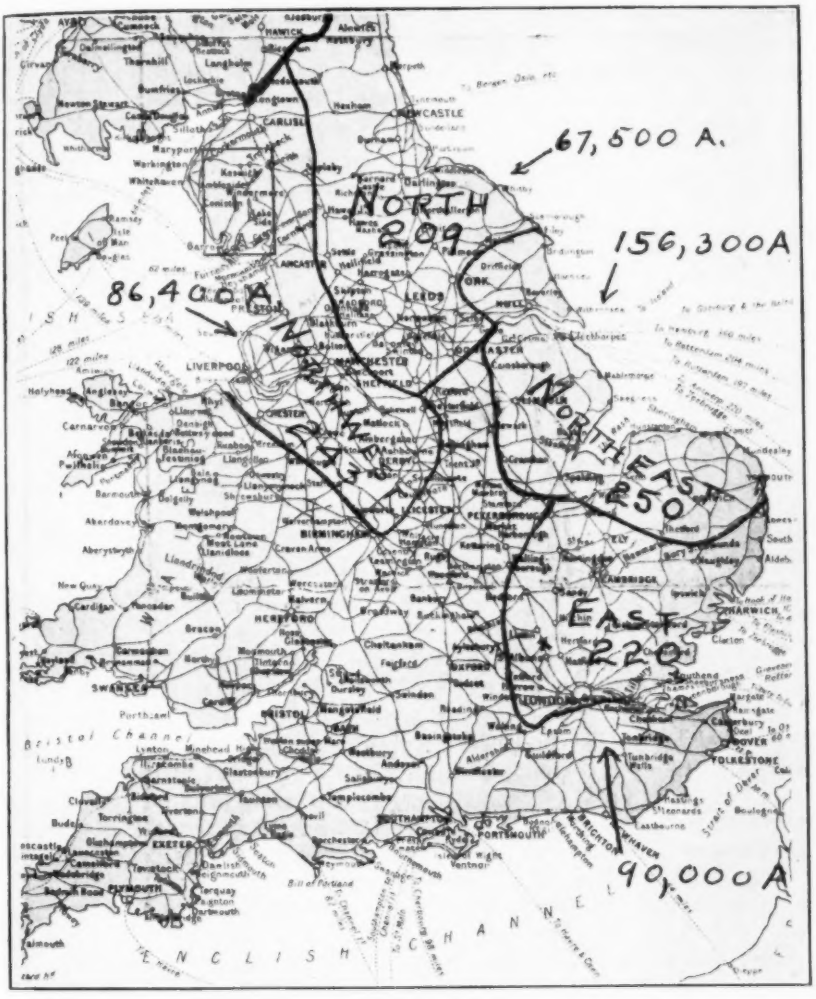
It is not surprising then that there is a widespread interest in breeding new immune varieties. The National Institute of Agriculture maintains a station at Ormskirk in the heart of the infested area of Lancashire primarily for testing new seedlings. The Earl of Derby offers gold medals for promising wart-immune seedlings, as a means of stimulating amateur breeders.

Cultural Practices

On the sandy soils of Lancashire the cultural practices are not far different from those of Maine or Prince Edward Island. The chief differences may be traced to the milder winters of England. Nematodes, popularly called eelworms, survive the winter and are a serious pest on potatoes when the crop is grown on the same field for more than one year. As a general practice, potatoes are grown only once in three or four years. Since clovers do very well, and livestock can be pastured most of the winter, rotations involving livestock are popular.

The manure is applied heavily to potatoes as far as it is available. With manure, a fertilizer analyzing about 7-12-17 is applied at the rate of 300 pounds per acre. Special seed potatoes from Scotland are required every two or three years. Since small potatoes that are not picked up at harvest may survive the winter, they frequently serve as centers for infection with virus diseases. This is probably one reason why virus diseases become sufficiently prevalent in two or three seasons to necessitate new seed from Scotland. Small, whole potatoes weighing from one to two ounces each, screened from the regular crop, are used for seed as far as they are available.

Aside from the wart and nematodes, late blight appears to be the only serious problem in the field. There was no sign of



The leading potato districts of England as reported by the Ministry of Agriculture. The numbers are the average yields in bushels per acre for the ten years, 1919-1928, and the acreage in 1929 for each district.

any other disease, nor of insect injury, in the fields I visited. Late blight is not taken seriously, although it seemed to me to be present everywhere. Apparently the enthusiasm with which it is combatted varies directly with the price prospects. Proprietary copper dusts are said to be used when the price prospects are good. The application of the dusts is called a "dry spray.' But in 1930 I saw no evidence of dry spray on

commercial plantings, because the price prospects were not encouraging. The English varieties are somewhat resistant to late blight. According to one grower, the Green Mountain succumbs more quickly to the blight than the standard English varieties.

The crop is commonly harvested with a rotary type of digger which looks like a modified hay tedder. The potatoes are gathered by hand, and screened by hand, with great care to avoid skinning them. They are stored in piles lightly covered with straw and earth. Such piles are called "clamps."

In the spring of 1930 the price of potatoes had dropped to 15 shillings a ton in the Lancashire district, about 11 cents a bushel. Consequently there was a wide interest in the possibilities of preserving the unsalable surplus for stock feed. The attempts to ensile the crop seemed to me to be rather successful. As it is a common practice to feed the culls to cattle or swine, and as it is customary to cook for swine, large cookers were at hand on most farms, so that the surplus was as a rule cooked before ensiling. To improve the consistency of the silage, various kinds of dry meal were commonly added. This silage was being fed during the summer of 1930 with excellent results.

In the Lincolnshire district at the east, the soil as I saw it appeared to be an alluvial silt, ideal for wheat but requiring special care to insure a good crop of potatoes. This land was reputed to be very valuable, selling for as high as 100 pounds (sterling) per acre. In order to insure a good crop on land of this value, special precautions are adopted and special equipment was to be seen. It is here that seed potatoes are greened throughout the winter in enormous glass houses. Only small whole seed is used, and it is planted carefully by hand to avoid injury to the green sprouts. I was told that each seed tuber was set with the sprouts upright. The glass houses on the larger farms were of the same design as our greenhouses. On some farms they appeared to cover five acres or more. These special processes to insure a good stand seem to an American more like transplanting than like ordinary potato planting.

Another special practice of interest to the visitor was the annual plowing of the subsoil. The regular potato plow is fitted with an enormous tooth which loosens the subsoil to a depth of 16 inches or more. The large steam tractors used to pull these plows can only be used in the common way when the soil is dry; and since it is rarely dry in England, the tractors are usually not run on the land, but are fitted with long steel cables wound upon a drum, so that the tractor may remain upon the hard road at the end of the field and draw the plow

across the field. Then another large tractor at the other end of the field draws the plow back. This is appropriately called "cable plowing."

In this district as well as in Lancashire large scale production of potatoes seems to be profitable. I was shown several farms with more than 500 acres in potatoes, and some were said to have more than 1,000 acres in a single field. Much of the equipment was correspondingly impressive to the traveler. The greenhouses covering five acres I have mentioned. The dusters were built to cover 26 rows. The trays for greening the seed when piled outside or in big sheds, so that tomatoes might be grown under the glass, were almost as impressive as the glasshouses.

The yields on the better farms were of course much above the average as reported by the government statistics. A good crop seemed to be about 500 bushels per acre. An extra fine crop might be 700 bushels. In my brief visit I found the growers more interested in keeping down the cost of production than in making yields. No one seemed interested in largest yields of a single acre.

Potato Experiments

One of the leading experiment stations as far as potatoes are concerned is at Kirton in Holland County, Lincolnshire. Here I had the pleasure of spending a day with Mr. J. K. Thompson who is in charge of the potato work. This station like several others started potato work on a considerable scale after the war. Although the field trials at Kirton date back only to 1921, many of the results are being applied in the country. The fertilizer experiments have been of especial value. According to Mr. Thompson, before the results of the experiments were announced in 1927, the common practice in the neighborhood was to use a 5-20-4 fertilizer. The experiments showed that a 7-12-10 was decidedly superior to that in common use, and that a 9-7-12 could be used where the land was known to be well supplied with phosphoric acid. The 7-12-10 is advocated at the rate of 15 hundredweight per acre if the prospects are five pounds (sterling) per ton; if the prospects are not this good, correspondingly less is advised.

There were also extensive variety trials, comparisons of seed from various sources, studies on size of seed, some work on the use of creosote salts to control nematodes, and experiments on the preservation of surplus potatoes for stock feed.

I did not have an opportunity to visit other places where similar work is under way. Those who were informed on the status of potato investigations, gave me to understand that the

work at Kirton was on a larger scale and more comprehensive than at any of the other stations. At Rothamsted the soil is somewhat too heavy for potatoes. A fertilizer experiment which was recently started there, laid out according to Fisher's scheme of replications, did not appear to be on soil where consistent large yields might be obtained. At Cambridge, Dr. Salaman was pursuing virus diseases, and attempting to isolate plants which were free from viruses that might be used as foundation lines for disease-free seed stocks.

In conclusion, I must add that the Englishmen I met were extremely cordial, displaying the same unbounded hospitality that one encounters in travelling through potato districts of America. I used no letters of introduction except the letterhead of the Potato Association of America. The Englishman was curious and rather amused at our attempts in the United States at national prohibition. He was rather distressed by our rigid embargo upon all potatoes from countries with wart disease. And he was relieved to learn that the terrible Colorado beetle had ceased to terrify us.

Two general impressions with regard to potatoes stand out in my mind as a result of this brief visit in 1930. First, large scale farming, on the level lands adapted to potatoes, seems to be established as a sound economic system. Second, reliance upon experiment stations is a relatively new idea, that seems to be growing. I confidently expect that the English agricultural experiment stations will increase in prestige and in staff in future years.

Potato Spraying and Dusting

DANIEL DEAN, Nichols, Tioga County, N. Y.

The history of potato spraying and dusting in America to the present time includes three stages. The first was that of the use of poisons, mainly arsenical, for the control of chewing insects. The Colorado potato beetle became a serious pest soon after 1870 and was responsible for the first wide extension of spraying. In parts of the middle west it is still regarded as the principal cause for the use of spraying. The sprayers used for the application of arsenicals in water for the control of the larvae of the Colorado potato beetle have usually been horse drawn machines covering four or six rows. Few use over one nozzle to each row. Pressures have been light, not

over 50 or 75 pounds. Small quantities of water to the acre are the rule.

The second stage in the evolution of potato spraying was reached soon after 1890 when eastern potato growers began to use the recently invented bordeaux mixture for the control of late blight and rot. The first sprayers used for this purpose were knapsack sprayers carried on the back, barrel pumps mounted on carts, and the small traction sprayers used for the control of potato beetles. Before many years growers had found that excepting where excessive quantities of bordeaux were used, sometimes 300 to 450 gallons per acre, these types of machines often failed to control late blight and rot in bad seasons. By 1912 the writer had worked up the old type of pump to a pressure of 175 pounds. Blight was very bad that season. By using two nozzles per row and extreme care in application the vines were held and the rot loss kept down to one-half of one per cent. This loss is the heaviest in twenty-six years of spraying, though blight conditions are very bad, due to situation in deep and narrow river valley often filled with fogs in summer.

After this bad blight year manufacturers rapidly increased the size and capacity of their spray pumps and pressures of 200 to 300 pounds became practicable. The limit on the capacity of the pump on horse drawn machines is the surplus of power available from the team after pulling the loaded tank through the field. Where blight is liable to be severe this limits traction machines to not over four rows.

The third stage in the use of potato sprayers was slow in obtaining recognition. With increased use of bordeaux spraying growers and scientists were surprised to find that in certain dry and hot seasons when weather conditions made late blight impossible the thorough spraying lengthened the life of potato plants compared with unsprayed plants and resulted in gains in yield that were sometimes even greater than the gains from the use of spraying in bad blight seasons. Prof. F. C. Stewart of the Geneva Experiment Station in a ten year test from 1902 to 1911 attributed these gains to the control of several insects which had been considered to be of minor importance. It was also noticed that well sprayed plats had much less tip-burn, a condition then supposed to be caused by heat and drouth.

In recent years the studies of Ball, DeLong and others have shown that the potato leaf-hopper is the principal cause of tip-burn, and that a good grade of spraying results in nearly perfect control of both the insect and the tip-burn. In this third and present stage of potato spraying the best spraying practice is based on making the control of the leaf-hopper and another

insect, the flea-beetle, the principle aim. From Ohio to as far west as Iowa and Minnesota it is recognized that late blight is seldom dangerous and that a grade of spraying good enough to control the insects mentioned will control late blight in case it should appear. Here, also, a minor potato disease, early blight can be regarded as a secondary trouble. The Colorado potato beetle passed out of the picture thirty or more years ago when growers found that with the use of bordeaux it was only necessary to add a small amount of arsenical as the eggs hatched.

In New York, Pennsylvania and the southern New England states late blight is very severe in occasional seasons, much worse than in the drier climate of the middle western states. Unless under the very worst conditions spraying good enough to control leaf-hoppers and flea-beetles is sufficient to control late blight and rot.

The heavy losses from late blight in Aroostook county between 1925 and 1930 and the small amount of leaf-hopper damage there compared to that in states further west show that spraying here is primarily a matter of blight control.

From 1900 to the present there has been a steady improvement in the design and construction of potato sprayers. The work of Prof. Nixon in Pennsylvania since 1920 has given great impetus to the use of higher pressures, 300 to 600 pounds, the use of three or four nozzles to each row, and of larger amounts of bordeaux per acre. Equally important has been his insistance on beginning spraying early in the life of the plant and on care in application. Many commercial growers now apply ten to fifteen sprayings as regular farm practice.

The use of gasoline motors to operate spray pumps has permitted a great increase in sprayer capacity in recent years. Many sprayers now cover six to ten rows, or even more. Traction sprayers are practically limited to four rows wherever late blight is dangerous. As sprayer size and capacity increase three different types of machine are being developed, with each having special good and bad qualities. The first and as yet by far the most common is the horse-drawn outfit with pump operated by gasoline motor. The second is that of spraying equipment drawn by or carried on a tractor, usually with pump driven by the tractor through a power take-off, but sometimes with independent motor. The third has spraying equipment carried on an auto truck, with either power take-off from truck motor or with independent pump.

The writer began using a knapsack sprayer in 1893, and a barrel pump on cart in 1898. From 1905 to 1923 different forms of 4-row traction sprayers were used, from 1924 to 1929 a six

row motor outfit, and in 1930 a 12-row tractor combine. In the summer and fall of 1930 the writer traveled over 4,500 miles to study different types of tractor, truck and motor sprayers in several states and under many varying conditions.

Each of these different types has its advantages and its disadvantages. Each will find its place in American potato production. Growers and manufacturers are constantly inventing new improvements. Success with spraying will often depend on selecting the type of equipment best adapted to the local conditions of soil, varieties, grade, climate and other problems peculiar to any farm or producing section. Owing to the extreme drouth of 1930 it was not possible to draw anything like final conclusions. In the past inadequate equipment has been more often than anything else the cause of failure or disappointment with spraying. With the present powerful equipment, success will be more a matter of skill in its use.

The practice of dusting potatoes has increased very fast in recent years. Strictly speaking, dusting means the application of the same materials as are used in spraying, copper, lime and arsenicals. These are carried to the vine by a blast of air instead of in water. At times the advocates of both dusting and spraying have been liable to make very strong statments about the value of their own methods, and about the disadvantages of their competitors. Under the extreme drouth conditions of 1930 spraying appears to have worked better than dusting. At the present time it is the writer's opinion that the recent rapid improvement in sprayers makes spraying more reliable than dusting.

The use of large machines covering six or more rows has brought out a fact of great importance, the damage caused to the roots and tops of the plants by spraying and dusting machines. Since 1906 the writer has always used wider row spaces where the wheels run to reduce this injury. With six row machines the damage is easily measured by comparing the yields of rows not affected by wheels with those so affected. A considerable number of such tests collected in the last few years shows great variation. With small vines under severe drouth conditions loss in yield may be small. One example of severe damage was with an eight row truck sprayer on a good crop of Green Mountains on Long Island. The grower dug nine blocks of four rows each, including the rows under the truck and those next outside the wheels, each block covering one-third of an acre. The three rows injured by the truck yielded 771 bushels. A second series of nine blocks made up of the rows out under ends of boom and not affected by sprayer wheels yielded 975 bushels, making the loss by wheel injury to be 68 bushels per acre.

In the past both growers and scientists have been accustomed to disregard the damage done in spraying or dusting. Only the effect of spray material upon the vines has been considered. Where spraying resulted in loss in yield, or where gains were small, the explanation was accepted that the spray material had not caused much effect.

We must now consider spraying and dusting in a different way. The clear proof that plant damage by the machine is nearly always present and sometimes very heavy, shows that the benefit from the spray material has often been greater than has been believed, though partly offset by the sprayer damage. We now need careful study of the relative amounts of damage done by different types and sizes of sprayers, tractors, trucks, etc., for the purpose of reducing this damage, while at the same time keeping or increasing the gains in yield from the action of the spray materials.

Scientific workers in other lines of potato work, as seed testing and fertilizers, must consider sprayer damage in their plans. For example, one seed strain test was sprayed with a six row sprayer. Although an attempt was made to adjust the yields of the damaged rows as compared with those not damaged it is plain that this is practically impossible, and that any accurate strain test must be planned to exclude variation from sprayer damage. This can be done by planting in blocks or by replicating the rows in such a way as to eliminate this factor.

The writer ventures to predict that a fourth stage of potato spraying will soon arrive and will be based on an attempt to control aphids. Certified seed growers face one of their worst problems in the transmission of virus diseases by these insects, and it is most unfortunate that so far no commercial means of control have been found equal in efficiency to those for late blight and rot, for Colorado potato beetles, or for leaf-hoppers by spraying thoroughly with bordeaux and arsenicals. Prof. Blodgett of Cornell has shown that thorough spraying with bordeaux even increases the number of aphids by destroying the natural controls that would otherwise hold these insects in check. The great importance of the certified seed industry will in time stimulate the discovery of practicable methods for the control of aphids.

Potato Seed Treatment With Formaldehyde Dust for the Control of Scab

J. S. WIANT[1], Plant Pathologist.
Wyoming State Agricultural Experiment Station, Laramie, Wyoming

Experiments conducted in 1929 indicated that a formaldehyde dust applied to the surface of scabby tubers prior to planting gave some control of this disease. Unfortunately the crop was seriously reduced by drought and the scab infection was low throughout. A more detailed test of this material[2] was made in 1930. Although the tests are largely those of one year the results are so striking that it is felt worth while to present them at this time.

Plan of Experiments

Formaldehyde dust was applied to the surface of heavily-scabbed Irish Cobbler potatoes by shaking them with the dust in a tightly-closed container. Applications of 1½ and 3 ounces of dust per bushel were made respectively before and in other lots after cutting. Hot formaldehyde (1-120, 3 minutes at 122°F.) was used as representative of a standard treatment. The checks consisted of similarly scabbed potatoes which were untreated. Tubers treated with dust after cutting were cut several days previous so that the surfaces were dry when dusted. All other tubers were cut immediately after treating. Treatments were made on May 20 following which the tubers were covered for one hour. Planting was made on the following day.

Each treatment was replicated in six rows of 40 hills. Six check rows of similar length were distributed uniformly with relation to the various treatments.

Results of the Experiment

Observations of stand were made on July 25. Considerable variation in stand was noted between the rows of the different treatments. Rows planted with untreated tubers showed a

[1]Acknowledgement is made to A. L. Nelson, Superintendent of the Dry Land Experiment Station, Archer, Wyoming, who co-operated by providing for the test plots at this station.

[2]The formaldehyde dust used in these tests was the commercial preparation "Smuttox," manufactured by the Stadler Products Company, Cleveland, Ohio.

much lower stand than those treated. A few plots affected with black-leg were observed in nearly all rows. The data on stand and black-leg are presented in Table 1.

The experimental plot was harvested in mid-October and the tubers were run over an 1½-inch screen. The severly cut or rotted tubers were placed with the undersized. These were designated as culls. The remaining tubers were sorted on the basis of scabby and scab-free. Most of those placed in the scab-free class were actually entirely free of scab. A few which showed several small lesions of surface scab were included in this class. The scab-free potatoes were well within the requirements of the U. S. No. 1 grade. The weight of culls was very low and the percentage of scab approximately the same as that in the larger size. Consequently the data on culls is not included. The data on total yield, percentage of scab and yield of scab-free No. 1 potatoes is presented in Table 1. The figures represent the average for the six rows of each treatment.

Discussion of the Results

The most striking fact brought out by the data in Table 1 is that of the very low yield of scab-free tubers in the check rows. This is partly due to the high percentage of scabby tubers in the check rows. Much of it is due to the poor stand. Thus if the yield of scab-free tubers is corrected for a 100 per cent stand the yields would be 35.9 pounds for the check in comparison with 39.9 and 49.4 pounds for treatments 1 and 2 respectively. A reduction in yield is not exactly proportional to reduction in stand nevertheless such a correction does indicate that the low yield in the check rows was in large measure due to the poor stand. It is unfortunate that more observations could not have been made on stand. There was no evidence that the Rhizoctonia disease played a significant role in these tests. On the other hand it was well known that black-leg was severe in the field from which these tubers were secured in 1929. The observations of July 25 on black-leg show that the disease was present in these tests. The data obtained at this time undoubtedly do not represent all of the black-leg present during the early part of the season. Consequently it is assumed that the reduction in stand was primarily due to black-leg and that many of the diseased plants had dried up and were blown away prior to July 25. If this be the correct interpretation then most of the treatments reduced black-leg very considerably.

All treatments gave large and significant differences in yield of scab-free tubers and in percentage of scab present when compared with the check. It should be stated that the degree

TABLE 1. RESULTS OF SEED TREATMENTS FOR THE CONTROL OF SCAB

(Undersized, severely cut, and rotted tubers not included. Each figure represents the average for six rows.)

Treatment No.	Treatment Employed	Percentage stand on July 25	No. of Plants affected with blackleg	Total Yield in pounds	Percentage of scabby tubers present (with probable error)	Yield of scab-free tubers in lbs. (with probable error)
1	Hot formaldehyde (1-120, 3 minutes at 122°F.)	97.5	2	39	3.85±0.6	37.8±1.8
2	Formaldehyde dust 3 oz. per bu. before cutting	93.8	5	46	4.52±0.4	44.5±2.7
3	Formaldehyde dust 3 oz. per bu. after cutting	89.3	4	39	8.25±1.5	36.2±1.3
4	Formaldehyde dust 1½ oz. per bu. before cutting	93.8	2	41	7.35±0.7	38.7±1.3
5	Formaldehyde dust 1½ oz. per bu. after cutting	82.5	4	36	9.80±1.0	32.3±0.8
6	Check—untreated	64.3	3	23	29.67±2.4	16.5±0.8

of scab infection per tuber was considerably higher in the check rows then in the treated rows—a fact not brought out in the table.

While the differences between the various treatments are not great and in some cases are not significant the results do show that a three-ounce application of formaldehyde dust applied before cutting was as effective as the standard hot formaldehyde treatment. Both of these treatments gave remarkably good control of scab under conditions which produced a severe scab infection in the untreated rows. The results suggest that the three-ounce application of dust prior to cutting was the most effective of the dust applications employed.

Conclusions

It is not proposed to make sweeping generalizations from tests of such limited nature as those reported here. The results are very interesting in showing that under the conditions existing during the course of this experiment formaldehyde dust applied to the surface of scabby tubers prior to planting effectively controlled scab and undoubtedly reduced the losses from blackleg. This paper adds an interesting viewpoint to our consideration of scab control.

New Knowledge of Potato Fertilizers

A radio talk by Mr. B. E. Brown, Division of Soil Fertility, Bureau of Chemistry and Soils, United States Department of Agriculture, delivered through Station WRC and 39 other stations associated with the National Broadcasting company, January 12, 1931.

I want to talk to you today about the potato crop and its fertilization. As a food crop I think you will agree with me that the potato will be found oftener on our tables than any other vegetable and probably eaten at least once a day in most American homes.

From the standpoint of production the reported world yield of potatoes, exclusive of Russia and China, was 5,245,000,000 bushels in one year, involving the utilization of 33,000,000 acres of land for an average yield per acre of about 160 bushels. Potato growers in this country produced commercially about 361,000,000 bushels of potatoes in 1930, accomplishing this on something like 3,400,000 acres, an average yield per acre of about

106 bushels. The farm value of the potato crops for 1929 and 1930 averaged about 400 million dollars.

In some sections of the United States the yields per acre run very high—several hundred bushels to the acre. The highest yield on record in the United States was well over 1,000 bushels to the acre. In other sections they are as low as 60 to 70 bushels. Such low yields are largely attributable to less favorable climatic and soil factors. The potato, to do its best, requires a relatively cool climate, good soil, ample moisture supply and plenty of available plant food.

In certain sections of the United States the potato is one of our most highly specialized crops and is grown on a large commercial scale. This special treatment of the potato crop has tended to insure high yields, good quality and low unit cost of production, or, in other words, low cost per bushel.

You potato growers in the sections to which I refer know what it means to produce potatoes on a commercial scale. You are fully aware that the high cost of producing your potato crop demands not only good soil and its careful preparation to insure a deep mellow seed bed, but also good seed, the best of cultural care and, in many sections, the use of plenty of available plant food. These, and other cost-of-production items have to be watched very carefully by the wide-awake potato grower who seeks at all times to lower his cost per bushel.

A good potato soil should work easily and not get in poor physical condition after heavy rains; it should be well supplied with organic matter or humus; it should be well drained but possess a good water-holding capacity. The soil should by all means possess a satisfactory physical condition to some depth, partly through deep plowing, to enable the roots of the potato plants to enter the soil readily and to allow for proper tuber development. Deep sandy soils and heavy, poorly-drained clays, or clay loams with compact subsoils close to the surface, should be avoided for potato production.

Now as to feeding the potato crop. We know that plants, like animals, must have food and drink. The potato grower will have quite a family of hungry young potato plants on an acre of ground—anywhere from 12 to 30 thousand, ordinarily from 15 to 20 thousand. These young plants will want plenty to eat, particularly the food elements nitrogen, phosphoric acid and potash. They can get a certain amount of food from the soil itself, but often what we term available plant food is not present in sufficient amounts to keep the potato plants growing as they should. This is why commercial fertilizer, which is primarily a mixture of available nitrogen, phosphoric acid and potash

compounds, gives the young plants a good send-off and supplies them with the plant food they need during the growing season. Underfed potato plants are a poor investment and without sufficient plant food to keep growing properly the yield will more than likely be reduced.

Potato growers in the United States use approximately 40 million dollars worth of fertilizers and fertilizer materials annually to produce the crop. This is a sizeable expenditure for plant food to put in the ground every year. It represents about one-eighth of all the complete fertilizer used in the United States, and amounts to about 750 thousand tons. With this in mind, the need of fertilizer investigations to determine what constitutes the proper use of this tremendous outlay for plant food on your different potato soils can be more fully appreciated. Just to indicate briefly the effect of fertilizer on potato production I should like to call your attention to some of our experimental results, comparing fertilized and unfertilized land. The general average of three years' results in Maine, New York, New Jersey, Pennsylvania and Virginia gave an increase per acre of 81 bushels for fertilized, over unfertilized land. The increase in Maine was 109 bushels per acre; on Long Island, N. Y., 98; Pennsylvania, 98; New Jersey, 58, and Virginia 61. It is quite evident therefore that the use of fertilizer on potatoes pays, and pays well.

There are quite a number of matters that require consideration in fertilizing potatoes aside from what kind and how much fertilizer to apply per acre. Questions of considerable importance are: (1) What proportion of nitrogen, phosphoric acid and potash to use in potato fertilizers; (2) what sources of nitrogen to employ; (3) how much nitrogen can be used economically; (4) what is the most favorable amount of phosphoric acid, and (5) how much and what source of potash to use. These are practical questions of great economic importance to potato growers which are being given consideration by the United States Department of Agriculture, through the Bureau of Chemistry and Soils, in cooperation with a number of the State Agricultural Experiment Stations, potato growers and their organizations.

An important study under way, which is comparatively new, relates to the use of concentrated fertilizers. By concentrated fertilizer is meant a fertilizer mixture weighing, say, one-third of a ton but containing as much plant food as a ton of ordinary high grade fertilizer. This great concentration of plant food is accomplished by selecting certain fertilizer materials containing high percentages of plant food. As an example, take Urea, an organic compound, now used to some extent in potato ferti-

lizers. It contains about 46 per cent of nitrogen, whereas many of the ordinary fertilizer materials contain less than 20 per cent of nitrogen. These concentrated fertilizers were first proposed as a means of saving on freight, handling, hauling, etc. While many problems connected with their use in crop production remain to be solved, it has been found through the cooperative studies that concentrated fertilizers are a big help to potato growers who, in many sections, use large amounts of fertilizers per acre, frequently 2,000 pounds or more.

We have found that the use of these concentrated fertilizers, two or three times as rich in plant food as ordinary fertilizers, requires more care on sandy soils than on heavier soils. A sandy soil dries out more quickly and does not have the water-holding capacity that the heavier loam or clay loam possesses. In a droughty period, unless the concentrated fertilizer is applied properly and well mixed with the soil, there is a greater chance of injuring the crop on the light soil. To avoid this as much as possible, the fertilizer should be applied so that it is equally distributed on both sides of the furrow in which the potato seed pieces drop, and a little below the level of the seed pieces rather than having all of it applied in the furrow.

Other studies of interest to potato growers being carried on are: Experiments to determine (1) the comparative value of different potash salts on yield, cooking quality and composition of potato tubers; (2) the influence of soil type on composition, cooking quality and yield; (3) the relation of soil reaction, both soil acidity and soil alkalinity, to potato production; (4) the relation of liming to potato production as it influences other crops in the rotation or prevents excessive acidity, (5) the influence of fertilizers and other materials to control certain soil-borne diseases like common scab, and finally, that of supplying the soil with organic matter. It has been stated that "humus is the real prop of any soil." Certainly the more organic matter you potato growers can get incorporated with your soil, the more moisture it will retain for the potato plants during dry years. This, in turn, means that more of your added fertilizer will be dissolved and utilized by the growing crop and that as a result you will be rewarded with larger yields at less cost per bushel.

The following suggestions relative to the use of fertilizers may prove serviceable to potato growers:

(1) Use a complete well-balanced fertilizer of high analysis;

(2) Never let fertilizer come in direct contact with the potato

seed pieces but try to get some of it placed near the seed piece;

(3) Mix fertilizer and soil together well;

(4) Use a potato planter or fertilizer distributor that will do a good job. If you are getting a poor stand and your neighbor is not, dig up and examine some of your potato seed pieces or young plants. If they should show fertilizer "burn" the chances are the fertilizer was either distributed unevenly or placed improperly. It is poor economy to use good certified seed and have it permanently injured;

(5) To insure even distribution in so far as the fertilizer itself is concerned, examine it before planting time. If it flows freely and doesn't separate, it should drill well;

(6) Buy your fertilizer on the basis of plant food per ton, not on a fancy name at a cheaper price. Quality counts in a potato fertilizer just as much as in a pair of shoes or in what we eat;

(7) Do not over fertilize, but by all means apply enough;

(8) Conserve the manure supply. Re-enforce it with superphosphate at the rate of 50-75 pounds to each ton of manure. Applied to sod land and plowed down this makes an excellent start toward good soil treatment for potatoes;

(9) Keep down weeds. Those uninvited plant outlaws eat and drink too, and thereby seriously compete with your potato plants for food and moisture. It is again poor economy to let the weeds get away with food intended for your potato plants;

(10) Grow your potato crop in a rotation if at all practicable to do so. Plowing under clover or alfalfa sod, sweet clover, rye, cowpeas, crimson clover, etc., are good ways to supply organic matter. The soil as a result can retain more rainfall and your fertilizer will be rendered more efficient.

(11) Finally, if you have a soil or fertilizer problem relating to your potato crop, by all means get in touch with your county agent, your State Agricultural Experiment Station or the United States Department of Agriculture. Your potato crop is too valuable, and takes too much of your time and effort, to neglect these sources of information.

Crop and Market News

Market Situation Stronger

(Contribution from the Bureau of Agricultural Economics)

After a long period of rather dull, draggy market, potato prices started to advance during the second week of March and were continuing their upward trend by the 20th of the month. A much better feeling prevailed everywhere, and there were renewed hopes for a satisfactory close of the season for old potatoes. Prices in Chicago by March 20 had advanced to the level which prevailed last October—the first time in five months. Shipments were very liberal, averaging fully 700 cars daily. On some days during late March, the movement from Maine exceeded 300 cars, and Idaho was shipping nearly 200 daily.

Two factors probably combined to push up the prices: The severe cold spell and heavy snowstorms of early March affected potato markets considerably. Track holdings in a dozen large eastern cities were down to a relatively low figure, and then all the dealers began to stock-up on old potatoes. The second factor probably influencing prices was the rapidly-diminishing supply in several important shipping areas, and the weather-damage which occurred to early southern crops, particularly in Texas.

Advances at shipping points since mid-February ranged 15c-40c per 100 pounds, and the improvement in terminal-market prices was even greater. The f. o. b. price of sacked Green Mountains in northern Maine had reached $1.45 per 100 pounds by the latter part of March, while Round Whites in western New York brought $1.50-$1.55, and the North Central States f. o. b. range was $1.40-$1.63. Colorado potatoes showed an extreme range of 98c-$1.40 at shipping points, while best Russet Burbanks in southern Idaho strengthened to $1.00-$1.10. The Yakima Valley of Washington was firm on U. S. No. 1 sacked Russets at $14-$15 per ton. The outlet for Washington potatoes this season has been somewhat restricted by heavy shipments from Idaho and Oregon.

The Chicago carlot market had reached $1.65-$1.90 per 100 pounds of northern Round White, while western potatoes ranged $1.75-$2.20 and April "futures" on Idaho Russetts advanced to an average of $1.87. Eastern jobbing prices were stronger on Maine Green Mountains. The market for new potatoes continued in fairly satisfactory condition, with 50-pound sacks of Texas Bliss Triumphs bringing $1.25-$2.00 on a jobbing basis and bushel packages from several sources ranging $2.25-$2.75. Barrels of Florida Spaulding Rose sold generally at $8.00-$11.00, —about the same as last spring.

Shipments of new potatoes, mainly from Florida, had increased to a daily average of 20 cars during late March and old stock, with more than 700 cars daily, was slightly heavier than a year ago. The early crop in southern Florida was yielding 85 to 120 bushels per acre. Hastings district seems to have escaped any serious damage from bad weather and that crop was expected to begin moving shortly before April 1. Early potatoes in the Rio Grande Valley of Texas suffered 40 per cent damage from blight and frost, but the Eagle Lake-Wharton crop came through very well.

Chicago Mercantile Exchange

Released Thursday, March 19

Trading in the 1931 crop of potatoes will be opened on the Chicago Mercantile Exchange April 1, Harry H. Field, president of the Exchange announced today. Two new contracts will be placed on the Exchange boards. Trading will be in Idaho Russet Standards and Round White Standards, both for delivery in October.

The decision to open trading in the fall delivery month came at the last meeting of the board of directors of the Exchange. So active has been the trading in potato futures since the first contract was opened last January 12th that it was felt necessary to start the new trading as soon as possible after definite information was had relating to the new crop.

It was also announced that the brokerage charge for the fall trading will be reduced to $10 per car. In the April Idaho contract the charge will remain at $12.50 per car.

The standard grade of potatoes will equal the U. S. No. 1 grading with a further provision by the Exchange to the effect that the potatoes must not be screened with the larger potatoes removed. Otherwise the grade corresponds exactly to the present U. S. No. 1.

Trading in the round white variety was decided upon in order to offer a somewhat broader trading field. While the Idaho contract has been used as a hedging medium by growers of other varieties potato men have urged that the two be included so that delivery of more than one variety could be made through the Exchange.

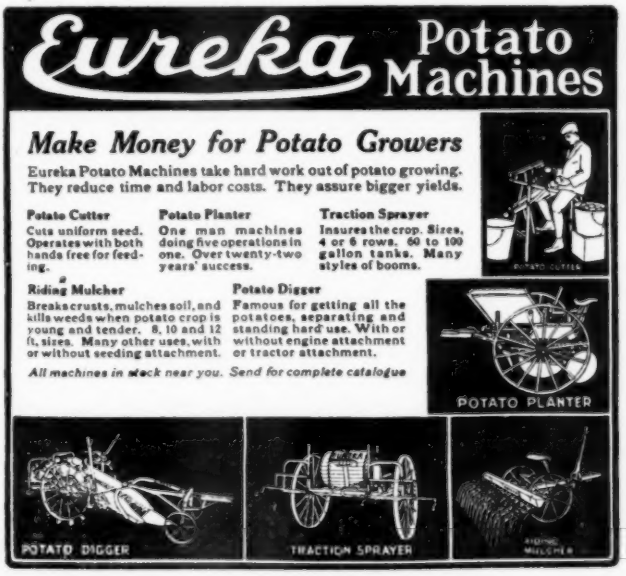
Mr. Field pointed out that nearly 2,000 cars of Idahos have been sold on the Exchange boards in the less than three months time trading has been available. He declared this large volume had more than justified the hopes of the Exchange and added that the activity had proved conclusively to the Exchange that futures trading in potatoes will be a success.

"We have every reason to believe that potato futures before the end of the 1931 season will prove one of the widest futures trading markets in the nation," Mr. Field said. "Already potato growers, shippers and distributors generally have been quick to avail themselves of the opportunity of hedging against future price changes.

"In the fact of a sharp reaction of open market prices of potatoes, the trade has been able to place hedges and obtain insurance against the losses which would have resulted. Recently, a forward move of prices has made an even greater hedging market available.

"Buying and selling orders have been executed on the Exchange from virtually every section of the country. The new trading has attracted a much wider field to the potato industry and even in the short time we have had the futures open on the Exchange the benefits of futures trading have been demonstrated clearly.

"We are firmly convinced the new contracts will open a still greater field. The long time contract will enable buyers and sellers to operate on a wider scale and will establish an open market of a far greater extent than ever before has been made available for potatoes."



Many Successful Potato Growers Use Eureka Two-Row Fertilizer Distributor and Eureka Two-Row Potato Planters

EUREKA MOWER CO. Utica, N. Y.

Notes

MAINE

A short time ago a letter was received in Houlton commenting on Aroostook potatoes in comparison with Prince Edward Island's. This letter was unfair to Aroostook growers and shippers because the writer was not familiar with the different ways that Maine potatoes are bought and marketed in the cities. For that reason all of Aroostook potatoes were judged by that peck.

I am advised that this peck of potatoes was purchased at a chain store. Now the rank and file of people today are looking for what they think are bargains and this applies to the purchase of potatoes as well as other commodities. The majority are governed by the price regardless of the best quality and they get just what they are bargaining for.

It is unfortunate that all buyers and consumers demands are not unanimous in regard to quality of potatoes. There is a class of operators here who are not at all fussy as to quality. Their chief objective is to get potatoes to the consumer at the lowest cost, irrespective of quality. They operate warehouses here and are heavy shippers. There are also individual buyers in the cities who supply a class of consumer-dealers with potatoes that are not sold on the merits of quality. A good many of these shipments are ungraded and are sold that way. We would rather not sell them this way, but we must meet the demands or lose the business. We are powerless to control the method by which our potatoes are sold to the consumers in the cities. If there are dealers who insist on getting them on an ungraded basis we cannot stop them. We or our product should not be criticised for this. The consuming public should be criticised and taught to buy a different product. Many of the city housewives do not know the difference. A potato is a potato to them.

On the other hand there are growers and shippers who take pains in growing and shipping a high quality product and make regular shipments of well graded potatoes to some of the best jobbers in the New England and South Atlantic states and received a premium for their product.

Aroostook potatoes should be judged by this graded product that goes to the high class trade and not by the jumbled mess that some dealers insist on selling and that many consumers are content to buy.

Our potatoes can be put up in small packages of 15 pounds just as well as can those of Prince Edward Island, if this is

what the consuming public want and are willing to pay for. The demand for this high quality small package product is so limited that in a section like ours where we have only about six weeks to dig, pick and get under cover a 50,000,000 bushel crop, a large part of it will have to be marketed in bulk or sacks. Prince Edward Island has an opportunity to produce potatoes freer from bruises because there are no rocks to contend with and she produces a small crop of 6,000,000 bushels. It stands to reason she can handle her product with more care and with less haste in marketing. However, in spite of this Maine growers are handling their product with more care than ever and losses from bruises are being minimized. This industry is a mammoth one and it is impossible to handle each potato like an egg.

We will admit that acreage and production of crops should be kept within bounds of consumption, but we do not agree that the Maine potato acreage should be cut or remain constant. It must be understood that here in Aroostook it is the only crop we can grow commercially and successfully because of climatic conditions and nearness to market. Our farmers are equipped to grow potatoes and know more about potatoes than any other crop. If we were in a diversified section it would be a different matter. It has been observed in the past that if Maine reduced her potato acreage, the slack was picked up by other states. Now these other states are growing several crops on a big scale equally as well as potatoes and I feel that if the acreage of potatoes is to be reduced, it should fall on these states and not in Maine, where there is only one crop of any consequence in bringing revenue to Maine.

In the point of the number of acres planted to potatoes, Maine stands sixth and is only able to out-produce Minnesota on an eight-year average production of five per cent through higher acre yields. Minnesota's average acres planted to this crop during this period was 130 per cent larger.

The average computed value of all Maine crops produced in 1927 and in 1928 was $49,957,750. In Minnesota the same years it was $329,810,000; in Wisconsin $301,276,000. Of course there are more farms in these states but when reduced to a per farm basis it is about $1,000 for Maine; $1,600 for Wisconsin and $1,800 for Minnesota. When it is known that these states and the other late crop potato producing states are among the leading dairy, beef, swine and poultry producing states, it is very evident that their per farm revenue is much larger than the average Maine farm. Our principal source of agricultural income is from potatoes and offers a fine opportunity for an increase.

Where is there a Maine banker, merchant or citizen who would object to seeing the revenue increased to $75,000,000 or more annually from the potato crop? We wish each and every state well, but we do not think that any of them will pull the "chestnuts" out of the fire for Maine. She must look after her own interests. If she is to grow agriculturally, Maine people must be responsible for her growth. Maine agriculturally speaking, has been too conservative in forging ahead.

We have heard a great deal about boosting Maine agriculture. What we need now is action. Maine never was in a better position. We need encouragement from everyone interested in Maine's future. Every Maine farmer should take advantage of any method that will increase his per acre yield and improve the quality of his potatoes and other crops as well and increase his acreage to an economical operating basis, all of which will tend to lower the cost of production and place Maine in a powerful position in this big industry.

—ANDREW J. SAUNDERS.

MAINE

Aroostook farmers can use more potash in their potato fertilizer.

Thirteen carefully conducted tests in widely separated parts of Aroostook County during the past three years prove the accuracy of this statement. Average results of these demonstrations are shown as follows:

	Yields, Bbls. per acre	
	Total	U. S. No. 1's
10% Potash	136.3	124.2
7% Potash	120.0	103.9
Gain for extra Potash	16.3	20.3

These tests were run on Caribou loam, a soil type which is not nearly as responsive to Potash as is the Washburn loam.

Growers are finding that 10% Potash gives more U. S. No. 1's per acre than fertilizers carrying 7% Potash. Also many seed growers observe that 10% Potash reduces the pointed-tipped tubers, and produces blockier and more even sized potatoes.

—R. F. THOMAS,
N. V. Potash Export My., Inc.

MAINE

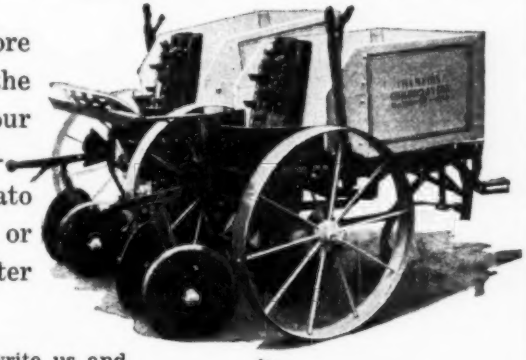
With a good season in 1931, Maine will produce the biggest crop of potatoes in the history of the industry. More land has been ploughed for potatoes than ever before. In 1930 there were 188,000 acres of potatoes in Maine but it is estimated that in 1931 considerably over 200,000 acres will be planted. The principal reasons are: first the use of farm machinery that makes it possible to handle a bigger acreage; second, the adaptability of the men and Maine to grow potatoes. For some time Maine has led all other states in the production of potatoes, not from an acreage standpoint, but from total bushels harvested.

From 1921 to 1928 inclusive Maine grew an average of 148,500 acres each year that produced 36,729,000 bushels of potatoes, an average per acre of 261.5 bushels. Minnesota for the same period grew an average of 341,500 acres which produced an average of 34,884,000 bushels. In other words even though her acreage was 130 per cent larger she produced five per cent less potatoes than Maine did.

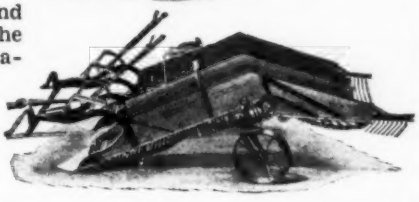
Wisconsin on 75 per cent more land produced 31 per cent less

O K CHAMPION LINE

We can tell you more and explain better the working merits of our 2-Row Potato Planters and 2-Row Potato Diggers for tractor or horse drawn by letter and circulars.



If you are interested, write us and get full information. Now is the time to look for labor saving machinery.



CHAMPION CORP.

4731 Sheffield Ave., Hammond, Ind.

potatoes than did Maine for the same years. Maine reached her highest year of production when from 179,000 acres in 1929, 50,121,000 bushels were harvested, an average per acre yield of 280 bushels. Maine's eight-year average yield per acre is 261 bushels compared with 116 bushels for the United States. It can therefore be seen that her production is accounted for by high per acre yields and not because of the largest acreage.

The principal reasons for the high average yield are: first, the use of liberal amounts of certified seed; second, liming and fertilizing to grow clover to plow under; third, high rate of application of fertilizers and protection of the vines and foliage from insects and fungus diseases by thorough spraying.

Due to the introduction of concentrated fertilizers, farmers are not only saving on freight and labor in handling but are applying more plant food per acre than ever before. It is common among the best Aroostook county farmers to apply from 1250-1400 pounds per acre of such analysis as 10-16-14 and 10-15-20, equivalent to 2500 to 2800 pounds of 5-8-7 and 5-8-10. With the soil well supplied with humus and by the use of modern planters no fertilizer injury is experienced. Concentrated fertilizer will play an important role in attaining high per acre yields and cause Maine to continue to forge ahead as the premier potato producing state in the United States.

More care is given to harvesting the crop than ever before to minimize loss from bruising, because it is realized that while high yields are the first objective the percentage of the crop that goes to market determines, in a large measure—profit.

—ANDREW J. SAUNDERS.

LOUISIANA POTATO TOUR

Due to continued cold weather, two light frosts occurring during the week, it is considered advisable to advance the date of the tour to April 21st, 22nd, 23rd, and 24th from April 7th to 10th, as previously announced.

Beginning at Houma in Terrebonne parish on the 21st, the tour will proceed to Lafourche parish on the 22nd, Pointe Coupee parish on the 23rd, and Rapides parish on the 24th.

A visit to the Federal and State Experiment plots at Houma and a meeting of the Louisiana Potato Association will be features of the first day's program. The experiment plots at the Agricultural college at Baton Rouge will be visited the morning of the 23rd, and the plots at Alexandria on the 24th.

—G. L. TIEBOUT.

WISCONSIN

A meeting was held at Rhinelander March 28 by the Wisconsin Potato Growers' Association to perfect a local state potato committee and to consider plans for the state potato show to be held in the new Rhinelander armory, October 27-30, 1931. Other matters discussed were the annual potato tour, the two state potato field days and a proposed inter-state conference on seed potato inspection, standard, grading and shipping regulations.

—J. G. IMLWARD.

Review of Recent Literature

TILFORD, PAUL F. Ohio Potato Diseases. Ohio Agr. Exp. Sta. Bul. 432: 1-38, Mar. 1929.—The bulletin is divided into five sections, introduction, control measures, degenerative diseases, leaf and stalk diseases, and tuber diseases.

The importance of disease-free seed, methods for treating seed, and a discussion of spraying and dusting are given under control measures. Other disease control measures which are emphasized are crop rotation, the proper handling of cut seed prior to planting, and proper storage conditions to prevent tuber rots.

Leafroll, mosaic, spindle tuber, giant hill, curly dwarf, and yellow dwarf are treated in the section on degenerative diseases. The symptoms, economic importance, and the best known control measures are given for each disease.

The leaf and stalk diseases are treated in much the same way as the degenerative diseases. A brief statement of the economic importance, the cause and symptoms, and the control is given for each. Early blight, late bright, hopperburn, tipburn, Fusarium wilt, Rhizoctonia, blackleg, lightning injury, and potash deficiency are discussed.

Under the section on tuber diseases, scab, wart, blackheart, spindle sprout, frost injury, storage rots, net necrosis, spindle sprout, yellow dwarf, early blight tuber rot, late blight tuber rot, Fusarium wilt, Rhizoctonia, and blackleg are described and control measures given for each.

Most technical terms have been omitted and the bulletin is written in a manner that can be understood by the average grower. It is well illustrated with photographs.

—P. E. TILFORD.

ANONYMOUS. More Food Value in Sweet Than in Irish Potatoes. Science News Letter 19:46, Jan. 17, 1931. Dr. D. Breese Jones and his collaborators in the Bureau of Chemistry and Soils of the U. S. Department of Agriculture have found that the protein of the sweet potato, ipomoein, is richer in the nutritionally-essential amino-acids that compose proteins than that obtained from the white potato. Proteins, those complex compounds of nitrogen, are necessary constituents of any diet. In the human diet proteins are naturally supplied in meat, eggs and milk. The potato and sweet potato are more important as sources of starch or fuel-energy-giving material. The proteins in both kinds of potatoes, however, are superior in nutritional quality to those of corn and white bread. Not all of the nitrogen in the potato is due to protein, but to other substances of less food value. These substances are not found in the sweet potatoes. According to Jones and his associates the sweet potato contains more vitamin A and is therefore regarded as a better balanced food.

—W. STUART.

PLENTY OF POTASH makes POTATOES PAY

AGRICULTURAL AND SCIENTIFIC BUREAU
N.V. POTASH EXPORT MY.
OF AMSTERDAM, HOLLAND
19 West 44th Street NEW YORK
Buckingham Bldg. CHICAGO ILL.